

WHAT IS CLAIMED IS:

1. An isolated polynucleotide, which encodes a protein comprising the amino acid sequence of SEQ ID NO:2.
2. The isolated polynucleotide of Claim 1, wherein said
5 protein has trehalose 6-phosphate synthase activity.
3. A vector comprising the isolated polynucleotide of Claim 1.
4. A host cell comprising the isolated polynucleotide of Claim 1.
- 10 5. The host cell of Claim 4, which is a *Coryneform* bacterium.
6. The host cell of Claim 4, wherein said host cell is selected from the group consisting of *Coryneform glutamicum*, *Corynebacterium acetoglutamicum*,
15 *Corynebacterium acetoacidophilum*, *Corynebacterium melassecola*, *Corynebacterium thermoaminogenes*, *Brevibacterium flavum*, *Brevibacterium lactofermentum*, and *Brevibacterium divaricatum*.
7. A method for detecting a nucleic acid with at least 70%
20 homology to nucleotide of Claim 1, comprising contacting a nucleic acid sample with a probe or primer comprising at least 15 consecutive nucleotides of the nucleotide

sequence of Claim 1, or at least 15 consecutive nucleotides of the complement thereof.

8. A method for producing a nucleic acid with at least 70% homology to nucleotide of Claim 1, comprising contacting
5 a nucleic acid sample with a primer comprising at least 15 consecutive nucleotides of the nucleotide sequence of Claim 1, or at least 15 consecutive nucleotides of the complement thereof.

9. A process for screening for polynucleotides, which
10 encode a protein having trehalose 6-phosphate synthase activity comprising

- a) hybridizing the isolated polynucleotide of Claim 1 to the polynucleotide to be screened;
- b) expressing the polynucleotide to produce a protein;
15 and
- c) detecting the presence or absence of trehalose 6-phosphate synthase activity in said protein.

10. A method for making a trehalose 6-phosphate synthase protein, comprising culturing the host cell of Claim 4
20 for a time and under conditions suitable for expression of the trehalose 6-phosphate synthase protein; and collecting the trehalose 6-phosphate synthase protein.

11. An isolated polynucleotide, which comprises SEQ ID
NO:1.
12. An isolated polynucleotide, which is complimentary to
the polynucleotide of Claim 11.
- 5 13. An isolated polynucleotide, which is at least 70%
identical to the polynucleotide of Claim 11.
14. An isolated polynucleotide, which is at least 80%
identical to the polynucleotide of Claim 11.
15. An isolated polynucleotide, which is at least 90%
10 identical to the polynucleotide of Claim 11.
16. An isolated polynucleotide, which comprises at least
15 consecutive nucleotides of the polynucleotide of
Claim 11.
17. An isolated polynucleotide; which hybridizes under
15 stringent conditions to the complementary polynucleotide
of Claim 11; wherein said stringent conditions comprise
washing in 5X SSC at a temperature from 50 to 68°C.
18. The isolated polynucleotide of Claim 11, which encodes
a protein having trehalose 6-phosphate activity.
- 20 19. A vector comprising the isolated polynucleotide of
Claim 11.

20. A host cell comprising the isolated polynucleotide of Claim 11.
21. The host cell of Claim 20, which is a *Coryneform* bacterium.
- 5 22. The host cell of Claim 20, wherein said host cell is selected from the group consisting of *Coryneform glutamicum*, *Corynebacterium acetoglutamicum*, *Corynebacterium acetoacidophilum*, *Corynebacterium melassecola*, *Corynebacterium thermoaminogenes*,
10 *Brevibacterium flavum*, *Brevibacterium lactofermentum*, and *Brevibacterium divaricatum*.
23. A process for screening for polynucleotides, which encode a protein having trehalose 6-phosphate synthase activity comprising
- 15 a) hybridizing the isolated polynucleotide of Claim 11 to the polynucleotide to be screened;
- b) expressing the polynucleotide to produce a protein; and
- c) detecting the presence or absence of trehalose 6-phosphate synthase activity in said protein.
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24. A process for screening for polynucleotides, which encode a protein having trehalose 6-phosphate synthase activity comprising
- a) hybridizing the isolated polynucleotide of Claim 11 to the polynucleotide to be screened;
 - b) expressing the polynucleotide to produce a protein; and
 - c) detecting the presence or absence of trehalose 6-phosphate synthase activity in said protein
25. A method for detecting a nucleic acid with at least 70% homology to nucleotide of Claim 11, comprising contacting a nucleic acid sample with a probe or primer comprising at least 15 consecutive nucleotides of the nucleotide sequence of Claim 11, or at least 15 consecutive nucleotides of the complement thereof.
26. A method for producing a nucleic acid with at least 70% homology to nucleotide of Claim 11, comprising contacting a nucleic acid sample with a primer comprising at least 15 consecutive nucleotides of the nucleotide sequence of Claim 11, or at least 15 consecutive nucleotides of the complement thereof.

27. A method for making a trehalose 6-phosphate synthase protein, comprising
- a) culturing the host cell of Claim 20 for a time and under conditions suitable for expression of the trehalose 6-phosphate synthase protein; and
 - b) collecting the trehalose 6-phosphate synthase protein.
28. A *Coryneform* bacterium, which comprises an attenuated *otsA* gene.
29. The *Coryneform* bacterium of Claim 28, wherein said *otsA* gene comprises the nucleotide sequence of SEQ ID NO:1.
30. The *Coryneform* bacterium of Claim 28, wherein said *otsA* gene comprises a nucleotide sequence that hybridizes under stringent conditions to a polynucleotide that is complimentary to SEQ ID NO:1, wherein said stringent conditions comprise washing in 5X SSC at a temperature of from 50 to 68°C.
31. *Corynebacterium glutamicum* DSM 14041.
32. A process for producing L-amino acids comprising culturing a bacterial cell in a medium suitable for

producing L-amino acids, wherein said bacterial cell comprises an attenuated *otsA* gene.

33. The process of Claim 32, wherein said bacterial cell is a *Coryneform* bacterium or *Brevibacterium*.

5 34. The process of Claim 33, wherein said bacterial cell is selected from the group consisting of *Coryneform glutamicum*, *Corynebacterium acetoglutamicum*, *Corynebacterium acetoacidophilum*, *Corynebacterium melassecola*, *Corynebacterium thermoaminogenes*,
10 *Brevibacterium flavum*, *Brevibacterium lactofermentum*, and *Brevibacterium divaricatum*.

35. The process of Claim 32, wherein said *otsA* gene comprises the nucleotide sequence of SEQ ID NO:1.

36. The process of Claim 32, wherein said *otsA* gene
15 comprises a nucleotide sequence that hybridizes under stringent conditions to a polynucleotide that is complimentary to SEQ ID NO:1, wherein said stringent conditions comprise washing in 5X SSC at a temperature of from 50 to 68°C.

20 37. The process of Claim 32, wherein said L-amino acid is L-lysine.

38. The process of Claim 32, wherein said bacteria further comprises at least one gene whose expression is enhanced, wherein said gene is selected from the group consisting of *dapA*, *gap*, *eno*, *tp1*, *pgk*, *zwf*, *pyc*, *mgo*,
5 *lysC*, *lysE*, and *zwa 1*.
39. The process of Claim 32, wherein said bacteria further comprises at least one gene whose expression is attenuated, wherein said gene is selected from the group consisting of *pck*, *pgi*, *poxB*, *zwa2*, *fda*, *hom*, *thrB*, and
10 *panD*.
40. An isolated polypeptide comprising the amino acid sequence of SEQ ID NO:2.
41. An isolated polypeptide, which has an amino acid sequence that is at least 90% identical to SEQ ID NO:2.
- 15 42. An isolated polynucleotide consisting essentially of SEQ ID NO:1.
43. A vector comprising the isolated polynucleotide of Claim 42.
44. A host cell comprising the isolated polynucleotide of
20 Claim 42.
45. A method of making a trehalose 6-phosphate synthase protein, comprising culturing the host cell of Claim 44

for a time and under conditions suitable for expression of the trehalose 6-phosphate synthase protein; and collecting said trehalose 6-phosphate synthase protein.